

## BIOMETRICS SOCIETY AND THE PROGRESS OF ANIMAL SCIENCE IN ROMANIA

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### Abstract

Romanian animal, agricultural and biological sciences were seriously damaged in the period 1948-1964 by the introduction of the Stalinsko-lasenko approach in the field of Genetics and by an empiric-pragmatic approach of agricultural theory. In 1965, it started the reintroduction of the real genetic science and in 1969 a small group of scientists (22, 3 animal scientists, 3 agriculturalists) registered in International Biometric Society aiming to change the scientific approach in experimental technique, genetic and animal breeding, ecological vision of animal production, education system. An international Congress of International Biometric Society was held in Romania. Some progress was achieved in all biological fields, but generally it was braked by the routine, by inertia. The number of Romanian agricultural members of Biometric Society decreased, the group disappeared after the year 1990, the biometricians were not present in research and education, but a correct approach is visible in Animal Breeding theory. It is noted that the biometric approach in biological sciences is originated from Darwin and Mendel theory, it was concretized by Galton and Pearson but the origin of Biometric Society (1946) is connected with S. Wright. Some basic scientific works of Quantitative Genetics and Evolution theory are noted.

**Key words:** animal sciences, biometrics, ecological vision, empiric-scientific theory

### INTRODUCTION

*“In any discipline on nature  
it is as much real science as  
Mathematics is contained in it”*

*Immanuel Kant, 1786*

With the restoration of genetic science in Romania (Draganescu, 1965), which had been abolished in 1948 under the "pressure" of Miciurist-Stalinist genetics causing serious damage to the Romanian zoo-agro-biological sciences, it has raised the issue of reintroducing *a mathematical spirit* in the field of genetics, experimental techniques, animal husbandry, agriculture and biology.

We note that, as Kant affirmed in 1786, cited by Blaga (1968), *“In any discipline on nature it is as much real science as Mathematics is contained in it”*. (In fact I understood that it was about fundamental sciences).

### MATERIALS AND METHODS

The paper presents the author opinions on the importance of Biometrics and its evolution at

world level but also in Romania for the development of Genetics and Animal Breeding.

A critical approach is carried out using the analysis and synthesis methods and logical deduction method as well emphasizing on the following aspects: the appearance of Biometrics, the most representative personalities across the time, the basic scientific works, the importance of biometrics for the development of animal science, animal genetics and breeding, the need to use biometricians and mathematicians in biological sciences both in the field of research and higher education.

### RESULTS AND DISCUSSIONS

*An exponent at global level of such a spirit necessary for biological sciences, including animal science as well, it was the International Biometrics Society, established in its current form in 1947 under the chairmanship of the great scientist and R.A.Fisher, father of the current science of*

experimental techniques, one of the founders of the Quantitative Genetics, Populations' Genetics, Modern Evolutionary Theory. As we stated, "Biometrics" has existed since the 19th century, imposed by the scientific truths specified by Darwin and Mendel.



*The objective of the Society was and still is to promote the development and application of mathematical and statistical theory and methods in the life sciences*, including agricultural, health, ecological, environmental and forestry sciences. It accepts as members statisticians, mathematicians, biologists, and all those concerned with interdisciplinary efforts for progress, recording and interpreting the biological sciences.

In 1965, the Society had 2,739 members, in 1971, 3,229 members, and in 1986 about 6,140 members. They were divided into about **15 scientific regions each with 52-2,528 members and about 10 national groups including 14-47 members**. Each region had a president, a secretary, a treasurer and an elected council, meetings and even its own scientific publications. The Biometrics Society organizes international conferences and symposia. **The 8th International Conference on Biometrics was held in Romania in Constanta, Romania.**

The Society has a journal (Biometrix) with scientific papers, a newsletter, which presents the summaries of the scientific communications presented in the meetings of the regional and national groups and a newsletter informing about the society structure, activity and names of its members. All its members receive publications, the subscription being included in the membership fee. The largest region in 1986 was the North-East

American region (2,528 members), and also Germany region which had that time 600 members (+ GDR 52), Brazil 201 members. A number of states of a less scientific importance (Tunisia, Senegal, Papua New Guinea, Burundi, Kenya, Jamaica, Ethiopia etc) had 3-5 members, which is caused by the fact that **all agricultural scientific research institutes from the Western countries had in the staff scheme at least a biometrician**, who, besides the mission to participate in planning the experimental technique in experiments and research, had also their own biometric investigations. We note that in the UK, in addition, there is a Research Center of Biometrics, and in France, INRA has a Department of Biometrics.

**"Romania Group" of the Biometrics Society was founded in 1969 with 22 members, reaching 17 members**, of which 5 were working with the Institute of Internal Medicine in 1986. Most of members were mathematicians or statisticians from Bucharest Center of Mathematics and Statistics, and the group secretary was Postelnicu, T.(1971-1986). In 1986, one of the members was a human doctor and two were zootechnicians (Drăgănescu, C. 1969-1992 and Moldovan, I, 1980-1992). At the foundation of the Center in 1969, had also participated other two zootechnicians: **A.Tacu**, an example of scientific ethics, one of the initiators of the organization, who died later in 1978) and Mărăndici (out of country) and three agronomists, the great scientist, **N. Ceapoiu**, A. Canarachee and A. Mudra.

We note that Hungary (1965-1986) had 10 to 15 members, and Czechoslovakia two members. The Group of biometricians in animal husbandry, to whom other scientists joined and acted **in 1965 - 1990 towards the introduction of a mathematical statistical spirit in the genetic sciences**, (in the years 1970 it was proposed and Prof. St. Popescu-Vifor translated the book "Animal Breeding" by J. Lush and Quantitative Genetics by Falconer) evolutionary theory, animal genetic breeding, even environmental science (by trying to upgrade the science of animal exploitation,

the calculus of ratios ). Much attention was paid to experimental techniques by A. Tacu, who, beyond the attempts made before the years 1948-1965, has developed the first experimental technique for animal science and Gh. Sandu tried later to bring a new development in this area. It should be noted that the penetration of mathematical and biometrical spirit in animal science was neither simple nor easy. ***Progress, recording and interpreting the new scientific visions were not always received either by the research institutes or higher education at the global scientific competition.***

Among the research institutes, only one named "Research Institute for Cattle Growing" employed two mathematicians-biometricians (not all mathematicians are able to assimilate biology ). ***After 1990***, one of them was dispensed by the Institute and the second one, who was agronomist engineer expert in animal science, Ph.D. in animal Science, Bachelor of Science in Mathematics, appreciated in 2012 by Canadian scientists for world priorities in the field of scientific biometrics applied in bull testing and to whom a Brazilian asked him recently his Ph.D. thesis ( a missing or disappeared thesis from Library), heir of the documentation of the old members of the Biometrics Society was "helped" by the Academy of Agricultural and Forestry Sciences to be early "retired". The other research institutes had at most laboratories of "experimental technique", relatively empirical laboratories, based on the mechanical recording of the existing rules.

In the field of education, Mathematical subjects were taught by mathematicians non-biometricians who have not knowledge of biology and ***the biometrics vision hardly penetrated or .. at all ( as in the applied ecology)***. In fact, the subject titles was changed from "growing" into "exploitation", and some subjects such as "Sheep"-G. Sandu, "Aviculture" a.s.o.) recorded some progress.

To train professionals with the scientific background focused on fundamental sciences is a difficult problem. Given the variation of skills and desires of students and graduates some decisions have to be carefully drawn in

universities and research institutes. Taking into consideration the experience of developed countries, I have insisted (1968 ... 1993 .. 1997) to introduce Optional Science Subject, grafted on two directions: 1. Science longer day study (5 years) and 2. Execution (3 years) and a careful attention for identifying students and graduates' skills.

Although profiles are often quite specialized, especially for science, In 1968 I affirmed that, in England, the curricula were set up in most faculties for each student based on training needs and his/her skills. *Karl Popper rightly compares science with art and music. He suggests that not all people have the same vocation for it, like for art and music. For glory or economic reasons, there are people who want to be considered "scientists", despite that they have not "vocation". Casti (2007) called them "false scientists" and their science a "pseudoscience".*

*The EU recommendations led, I think formally, to such a "modernization", but the goal "to create scientist" and competent decision makers, unmistakable with the execution people, seems to be out of sight and maintains a lack of competitiveness in the field of science and decision making. We could be fear that, paraphrasing Noica, ***we can achieve science centers, but the science they produce is just a sham.****

Romanian National Group of Biometrics has led an own scientific life especially among mathematicians - statisticians dealing with animal husbandry, but without zootechnicians. In a paper written in 1985, I draw attention to this issue.

***Basically Today, we remarked the scientific contact achieved by IBNA (INZ), and by Prof H. Grosu with Canadian biometric forums, materialized by a significant scientific synthesis in English - "History of the cattle genetic evaluation methods,"*** an interesting paper for some review of the evolution of biometric approach of this problem in Romania, and for Romanian presence in the "civilized" scientific world .

***So, there is a chance of recovery and alignment of the Romanian Biometrics and o some areas of Romanian animal husbandry***

*as well to the advanced countries. It is not complicated task to establish a laboratory of biometrics within IBNA, but this target should be exceeded in all the fields of Romanian agricultural sciences. We said "complication", because it is not easy to find and form biometricians dedicated to animal husbandry at the moment when "the wire is cut". In 2001, Mr. Grosu tried to find support from the Faculty of Mathematics and Statistics of Bucharest University, but his attempt failed in a similar manner as failed the attempt to employ a biometrician at faculty.*

*The author of these lines feels guilty because after his retirement gave up its modest activity, namely his presence in the Romanian group of biometrics, whose existence is not even certain. It should be noted that at international level, the Romanian Society of Biometrics exists and has a sustained activity (in 2014, the meeting will be held in Florence, Italy, a fact which should be retained by Academy of Agricultural and Forestry Sciences and even by the Romanian Academy.*

#### **From Biometrics of Galton (1822-1911) - Pearson, to the current Biometrics-Fisher (1890-1962)**

The introduction of the statistical mathematical vision in biology was not a novelty of the year 1946, but it was as we have shown the effect of major scientific advances in the 19<sup>th</sup> century. Charles Darwin was the first scientist who treated evolution as a statistical process (Fisher 1931). Mendel's methodics (a professor of Physics, with a well-defined mathematical background) is essentially statistical, and his laws of probability are laws formulated in terms of relative frequency. The statistical vision of these two great scientists was, however, largely intuitive. The merit to move from the intuitive statistical treatment to a statistical-mathematical one belongs to F. Galton. He demonstrated that the phenomena of heredity are essentially deviations from the population average, they are mathematical correlations and regressions between parents and offspring ("Typical Laws of Heredity in Man" -1877, Natural inheritance "1889).

Galton's collaborator and follower, **K. Pearson** (1856-1936), took over and developed his ideas, starting with the study of heredity and ending with mathematical foundation of the methods. In 1900, Pearson together with Weldon founded the journal "*Biometrika*" and besides Fisher and "*Student*" (W.S.Gosset) are among the founders of mathematical statistics, a branch of probability theory. Pearson's era in biometrics is known as the era of correlations and the quantitative genetics is considered its fruit. It has stimulated the entry of a certain mathematical vision in Romania in the experimental technique, in agricultural and animal husbandry (Gh.K. Constantiescu, Gh. Moldoveanu, Ionescu Sisești, N. Săulescu etc.), a little bit abolished in 1948. In this context, it happened one of the tragic and comical episodes of the history of Genetics.

**Mendelism, with statistical methods and probabilistic laws, encountered a violent opposition from statisticians**, led by Pearson (Drăgănescu 1974). Their opposition went to the closing of the pages of journals "Biometrika" and "Nature" for Gr. Mendel's followers. Pearson's biographers defended him, claiming that he understood "Mendelism", but he considered it too simplistic. In this era, however, it takes place significant genetic gradual accumulation beyond Pearson's vision. In 1908, it was launched the so called "Hardy-Weinberg Law" and the idea that quantitative characters are transmitted according to the Mendelian mechanism.

The final reconciliation between the school of "Pearson's biometric" (actually English school) and the classical Mendelist school took place later around the year 1920. The cause and outcome of this reconciliation was the appearance of the Quantitative Genetics, Population Genetics and later, in 1946, of the current Society of Biometrics and its publications.

We note that the basic works establishing the Quantitative Genetics and Population Genetics are: **S.Wright (1921) "Systems of Mating", R.A.Fisher (1918) "The Correlation between relatives in supposition**

*of the existence of Mendelian heredity"., R.A.Fisher (1930) "Genetic Theory of Natural Selection", S. Wright 1931 "Evolution in Mendelian Populations" , H.B.S. Haldane (1932) "Mathematical Theory of Natural and Artificial Selection". These are classical works which should not miss from any scientific library of animal science. We referred to them earlier (1965, 1967, 1974, 1978). They were the basis for improving animal breeding theory, outlined by S. Wright and developed by J. Lush in 1935 ..... 1947.*

## CONCLUSIONS

The Biometric vision in animal sciences is their approach on the basis of fundamental sciences (mathematics, chemistry, even economics, and philosophy). This is the condition of their progress and efficiency. The elimination of "Lisenko Genetics" and the registration to the International Biometric Society were a progress factor for animal science in Romania after the year 1970. A proof of that was the World Congress of International Biometric Society organized in Romania. The old routine and inertia didn't allow to all scientific centers to produce a science competitive to the highest world centers. Some bad evolution can be noted by the absence even elimination of biometricians from scientific research or university centers, even by the retirement of the Romanian biometric group after 1990 from the Biometric Society. The recent appearance of a book on the History of Cattle testing can be a hope that the situation could be remediated. A new registration of a Romanian group (with agriculturalists members) in the Biometric Society, a presence of biometricians in all animal farm scientific centers, a correct presentation of science evolution and the presence of basic, nodal scientific papers in scientific libraries is a strong need of scientific and production evolution to an EU competitive level.

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